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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/099,705	03/14/2002	Maurice J. Halmos	PD-00W143	4118

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PATENT DOCKET ADMINISTRATION  
RAYTHEON SYSTEMS COMPANY  
P.O. BOX 902 (E1/E150)  
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EL SEGUNDO, CA 90245-0902

EXAMINER

YAM, STEPHEN K

ART UNIT	PAPER NUMBER
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2878

DATE MAILED: 04/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/099,705

Applicant(s)

HALMOS, MAURICE J.

Examiner

Stephen Yam

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-- Th MAILING DATE of this communication appears on th cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 and 3-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1 and 3-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 1203.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 22, 2003 has been entered. Claims 1 and 3-16 are still pending.

### ***Information Disclosure Statement***

The Paranto US-5,621,514A reference has already been considered in a prior Office Action, so its listing on the Information Disclosure Statement is unnecessary.

### ***Claim Objections***

2. Claims 9, 14, and 15 objected to because of the following informalities:  
In Claims 9, 14, and 15, "the signal processor" lacks proper antecedent basis.  
Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3, 7, 9, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minden et al. A Range-Resolved Doppler Imaging Sensor Based on Fiber Lasers in view of Shigematsu US Patent No. 4,948,246.

Regarding Claims 1, 3, 7, 9, 15, and 16, Minden et al. teach a ladar system comprising a mode locked laser transmitter (see section II), a receiver adapted to detect signals transmitted by the laser and reflected by an object (see section I, lines 20-22), and means for processing (see section V) the detected signals to increase cross-range (i.e. velocity) resolution (see section V, lines 43-46- Doppler shift indicates velocity, see also section I, lines 8-11). Regarding Claim 3, Minden et al. teach the laser transmitter including a laser (see section II, lines 27-29) and means for mode locking the output thereof (see section II, lines 7-10). Regarding Claim 7, Minden et al. teach the means for mode locking including a quantum well absorber (see section I, lines 51-55 and section II, lines 7-22). Regarding Claim 9, Minden et al. teach the means for processing including a range de-multiplexer for organizing the signals into range bins (see section I, lines 44-48). Regarding Claim 15, Minden et al. teach a local oscillator for generating a reference beam (see section IV, lines 1-26). Regarding Claim 16, Minden et al. teach the receiver combining the reflected signal with the reference beam (see section IV, lines 4-7). Minden et al. do not teach means for moving the laser transmitter and receiver, wherein the direction of motion forms a large angle with the direction of the transmitted laser beam. Shigematsu teaches (see Fig. 3) a similar ladar system, with means for moving the laser transmitter (5) and receiver (7), wherein the direction of motion forms a large angle with the direction of the transmitted laser beam (see Fig. 7A-7D). It would have been obvious to one of ordinary skill in the art at the time

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the invention was made to provide means for moving the laser transmitter and receiver, wherein the direction of motion forms a large angle with the direction of the transmitted laser beam, as taught by Shigematsu in the ladar system of Minden et al., to increase the detection area to provide a wide-spread detection zone.

5. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minden et al. in view of Shigematsu as applied to Claim 3, further in view of Hammons et al. US Patent No. 6,327,282.

Regarding Claims 4-6, Minden et al. in view of Shigematsu teach the system in Claim 3, according to the appropriate paragraph above. Regarding Claim 6, Minden et al. teach means for pumping the laser via an optical fiber (see section II, lines 1-6 and 27-33). Minden et al. do not teach the laser as an erbium-doped or erbium, ytterbium-doped crystal laser. Hammons et al. teach a laser for transmitting mode-locked pulses (see Col. 4, lines 49-52) by using an erbium-doped or erbium, ytterbium-doped crystal (see Col. 3, lines 55-67). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an erbium-doped or erbium, ytterbium-doped crystal laser as taught by Hammons et al. in the system of Minden et al. in view of Shigematsu, to provide wavelength tuning to a desired output optical wavelength.

6. Claim 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minden et al. in view of Shigematsu as applied to Claim 3, further in view of Coppock et al. US Patent No. 4,339,821.

Minden et al. in view of Shigematsu teach the system in Claim 3, according to the appropriate paragraph above. Minden et al. do not teach said means for mode-locking including an acoustic crystal. Coppock et al. teach (see Fig. 1) a similar mode-locked laser transmitter (10, 18) including a laser (10) and means (18) for mode locking the output thereof, including an acoustic crystal (see Col. 1, lines 49-54 and Col. 2, lines 24-27 and 36-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an acoustic crystal in the laser transmitter as taught by Coppock et al. in the system of Minden et al. in view of Shigematsu, to provide increased laser efficiency, as taught by Coppock et al. (see Col. 1, lines 45-48).

7. Claims 10, 11, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minden et al. in view of Shigematsu as applied to Claim 9, further in view of Paranto et al. US Patent No. 5,621,514.

Regarding Claims 10, 11, and 14, Minden et al. in view of Shigematsu teach the system in Claim 9, according to the appropriate paragraph above. Minden et al. do not teach means for extracting a signal representing Doppler frequencies detected for each range bin including means for computing a frequency spectrum associated with each range bin, or means for extracting a signal representing intensity of the signal detected for each range bin. Paranto et al. teach a similar ladar system, with means for processing (32, 33) including a range demultiplexer (see Abstract, lines 16-18 and Col. 3, lines 60-63) for organizing the signals into range bins, means for extracting a signal (see Abstract, lines 16-18) representing Doppler frequencies detected for each range bin, wherein said means for extracting Doppler frequencies includes means for

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computing a frequency spectrum associated with each range bin (see Abstract, lines 16-18), and wherein the means for processing includes means for extracting a signal representing intensity (inherent within a “frequency spectrum” output) of the signal detected for each range bin (see Abstract, lines 16-18). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide means for extracting a signal representing Doppler frequencies detected for each range bin including means for computing a frequency spectrum associated with each range bin, and to include means for extracting a signal representing intensity of the signal detected for each range bin, as taught by Paranto et al. in the system of Minden et al. in view of Shigematsu, to provide a clear range-resolved Doppler image having both accurate range and velocity measurements, as taught by Paranto et al. (see Col. 1, line 62 to Col. 2, line 16).

8. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Minden et al. in view of Shigematsu and Paranto et al. as applied to Claim 11, further in view of Phillips et al. US Patent No. 5,835,199.

Minden et al. in view of Shigematsu and Paranto et al. teach the system in Claim 11, according to the appropriate paragraph above. Minden et al. also teach performing a Fourier Transform to compute a frequency spectrum (see section V, lines 32-34 and 43-45). Minden et al. do not teach the means for computing a frequency spectrum including a Fast Fourier Transform. Phillips et al. teach a ladar system (see Col. 3, lines 13-21) using a Fast Fourier Transform (see Col. 31, lines 53-56) to compute and analyze a frequency spectrum (see Col. 31, line 56 to Col. 32, line 6). It would have been obvious to one of ordinary skill in the art at the

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time the invention was made to use a Fast Fourier Transform as taught by Phillips et al. in the means for computing a frequency spectrum in the system of Minden et al. in view of Shigematsu and Paranto et al., to utilize common processors already designed for performing FFT frequency computations, to save costs and simplify system design.

9. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Minden et al. in view of Shigematsu and Paranto et al. as applied to Claim 11, further in view of Pearson US Patent No. 4,516,853.

Minden et al. in view of Shigematsu and Paranto et al. teach the system in Claim 11, according to the appropriate paragraph above. Minden et al. do not teach the means for extracting Doppler frequencies further including means for detecting centroids of said frequency spectrums. Pearson teaches a ladar system comprising a mode locked laser transmitter (110, 122, 132) (see Col. 3, lines 2-3 and Col. 4, lines 9-10), a receiver (129, 134) adapted to detect signals transmitted by the laser and reflected (from (172) from an object (170), and a signal processor (127, 220) for analyzing the signals, wherein the centroids of the frequency spectrums are detected (see Col. 3, lines 50-56). It would have been obvious to one of ordinary skill in the art at the time the invention was made to detect the centroids of the frequency spectrums as taught by Pearson in the system of Minden et al. in view of Shigematsu and Paranto et al., to detect the velocity and movement of the object, as taught by Pearson (see Col. 4, lines 50-56).

### ***Conclusion***



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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Yam whose telephone number is (571)272-2449. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571)272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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**THANH X. LUU**  
**PATENT EXAMINER**